Agricultural Outlook Forum'98

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Agricultural Outlook Forum For Release: Monday, February 23, 1998

A FARMER LOOKS AT RISK MANAGEMENT

by

The Honorable David A. Swinford
State Representative
Texas House of Representatives

Farmers make professional gamblers look like wimps. Can you imagine putting your entire worth, your home and all your dreams into an agricultural product - a product that depends on the weather, insect control, weed control, foreign markets, world politics, rumors of the President's love life, Oprah and Saddam Hussein? This is the sort of risk that they take and yet tell you they won't gamble on the "futures market." You know in fact that not protecting production costs or production of a crop is really the gamble.

Being a producer that markets the crops from my farm as well as being the marketing manager for a large grain co-op, gives me a rather unique view of risk management. Representing my district in the Texas Legislature and serving as the Vice-President of our Agriculture and Livestock Committee really brings a multitude of agriculture decisions before my desk.

To fully understand my perspective on this subject, let me first describe my area of Texas. I live in the panhandle of Texas - north of Amarillo. This area is one of the most productive in the world. We depend on irrigation which turns a desert into an agricultural paradise. Our small area produces 44% of the wheat, 33% of the corn, 27% of the milo, 100% of the sugarbeets, 76% of the fed beef, and 11% of the hogs in the state of Texas. In addition, the area has enough oil and gas to make it one of the dynamic economic areas in the U.S. Because we depend so much on irrigation, we depend much less on mother nature. We use water where and when we need it. My point being that irrigation is a type of risk managment - production risk management.

Another facet of production risk management is the use of crop revenue insurance coverage or hail insurance. We of course suggest this insurance along with the latest in production technology, pest management and cultural practices to maximize yield. Nothing will replace yield. The flip-side of production risk managment is price risk management which is also the hard part for our farmers. I joke and tell them they always use the three step approach - hope, greed and then fear. Hope is always present at planting time regardless of price. When mother nature puts her world in bloom, how can you doubt that this will be the crop to end all crops? The farmer has both production hope and price hope. Hope usually lingers until the price starts up, and then greed sets in. The thinking is that the price has to go up - it did last year, right? Sure enough, planting scares, floods, drought, and uncertain crop size usually make the futures price jump some time during the crop year. Are we ready to capture this opportunity? Heck no!

They will have to pry this corn out of my dead hands! No one will get ***my*** corn for less than $5.00/bushel. Greed is set in concrete. Farmers tend not to sell on an up market. If the market starts down, he waits. He's not going to let them steal his corn. Then the price keeps going down, down, down. His banker tells him to sell, his wife threatens him with divorce, his doctor tells him he will die from stress, and finally, fear causes him to sell. This scenario happens to the farmer or livestock producer each year if he does not develop a risk management marketing plan.

What kind of plan should be used? I recommend the following:

1. Determine the cost of production. If the cost is not known, you might sell too cheap.
2. Determine your five year yield on each farm. Take 80% of that yield and calculate the maximum contractable bushels.
3. Draw a grain bin on a piece of paper and divide the bin with lines at each one-third level.
4. Market the bottom one-third of the bin at any time you can get your cost of production plus a reasonable profit. (By "market" I mean forward contract to your local elevator or processor. Leave the price risk up to them.)
5. Move to the next one-third of your grain bin. This one-third should be hedged (selling of futures) instead of actual grain when prices reach a desired level. In effect, this will lock in a price for later delivery when the actual cash grain is delivered and sold so that the futures would be purchased.
6. The final one-third of your grain can be hedged by buying puts (a right but no obligation to buy futures) at a profitable level. This provides a minimum price but allows for the price to go up. You sell your grain and yet benefit if the price goes up. Delivery is not required in case of failed production.

If you have an average crop, this will allow 20% not previously sold to move into the market at anytime it becomes profitable and complete your sales.

The most important aspect of any marketing plan is having it written down and execute it without second-guessing yourself. If needed, instructions to market your grain at specific values can be left with your broker or buyer so you can go about farming.

Risk management sounds so simple yet many find it very difficult to give up that human element that follows the hope, greed then fear theory embedded in our souls. I can tell you today that I have two-thirds of my corn and wheat crops priced at a profitable level, and I am two months away from planting corn. I maintain that there is greater leverage in *selling* then growing the crop than growing the crop and waiting to see what people will give for the crop.

GRAIN OUTPUT TRAITS — END USE AND CONSUMER BENEFITS

Nick Frey, Vice President, Food/Oils
Optimum Quality Grains, L.L.C.

It is a pleasure for me to be here this afternoon to offer the outlook of Optimum Quality Grains on the emerging transformation of grain and oilseeds. The agri-food industry approaches the new millennium facing two fundamental challenges:

1.) Producing sufficient quantities of food to support a global population that is increasing at the rate of 100 million people per year.

2.) Improving the quality and functionality of food to improve the health and nutrition of our global family.

Study after study in recent years has made it abundantly clear that there is a strong link between diet and human health. For example:

- Saturated fats have been associated with the buildup of serum cholesterol, a leading indicator of heart disease.

- There is a growing body of medical evidence that *trans* fatty acids actually raise the levels of LDL, the so-called bad cholesterol, and reduce the levels of HDL, the good cholesterol.

- There is growing evidence that the isoflavone composition of soybeans can prevent or reverse the debilitating disease, osteoporosis, and reduce risks of certain kinds of cancer.

Optimum Quality Grains is the new joint venture of DuPont and Pioneer Hi-Bred International. Our core purpose is to improve the world's food supply through customer-driven innovation.

We begin our work at the convergence of a number of important market trends.

- An unprecedented consumer-driven influence in product and service creation;
- An evolution in technology and innovation from 100 years of dominance by physics and chemistry, to the age of biology, biotechnology and information;
- The coming together of very diverse and yet synergistic market participants as partners;
- A rapid expansion of global opportunities all around us; and
- A growing desire among food companies and consumers for improvements in food functionality, healthfulness and flavor.

It is into this environment that Optimum Quality Grains hopes to lead the world in creating and providing value-enhanced ingredients derived from unique grain and oilseeds to meet specific customer needs for food, feed and industrial uses.

Biotechnology offers a unique opportunity for us to shift the market paradigm from one that is driven by supply (commodities) to one that requires demand-driven product differentiation in production agriculture.

Consumers want ingredients that provide good-tasting foods and need those foods to provide good nutrition that helps sustain their health. But, most consumers are confused about nutrition, and this is especially true as consumers try to balance consumption of foods containing oils and fats.

Thus, we struggle to commercialize new and improved vegetable oils that can address health and nutrition concerns about serum cholesterol levels and risks of coronary disease while providing foods with the same great taste we have always enjoyed.

In order to provide the flavor consumers expect and the performance food manufacturers and food service providers seek to control quality and cost, most vegetable oils now used for frying are hydrogenated. The only alternatives are coconut, palm and cottonseed oil or tallow and lard, which are high in undesirable saturated fats.

We already have introduced two new soybeans with oils that meet the flavor, nutrition and stability requirements consumers and food companies want and that offer lower saturated fat or are naturally stable, eliminating the need for hydrogenation that forms *trans* fatty acids.

One of these products is high oleic soybeans. These soybeans will be produced on approximately 25,000 acres in 1998 and will produce an oil that:

- Is 30-40 percent lower in saturated fat than normal soybean oil;
- Is resistant to oxidation, extending shelf life of oil-containing foods;
- Offers better flavor stability and is less likely to become rancid;
- Reduces the need for hydrogenation, thus eliminating *trans* fatty acids; and
- Offers excellent fryer life in frying applications.

Optimum high oleic soybean oil could replace most hydrogenated soybean oil now used in frying or as spray oils for shelf-stable foods.

Optimum, in partnership with Iowa State University, also introduced LoSatSoy™ , an oil that contains 7 percent saturated fat, about half the saturated fat of normal soybean oil.

About 13 billion pounds of soyoil are consumed in the U.S. each year. If LoSatSoy™ were to be used, and the 7 percent reduction in saturated fat was achieved in all applications, over 900 million pounds of saturated fat could be eliminated from the American diet.

That 900-million-pound reduction equates to removal of over 3 pounds of saturated fat from the diet of every man, woman and child in the United States without changing the foods we eat and enjoy. Wouldn't that be an important dietary change for consumers and a positive public health initiative for America?

The USDA has responded to this new product opportunity and is evaluating LoSatSoy™ for use in the School Lunch Program as one of the ways it can balance its menus to meet statutory requirements that assure the healthfulness of government meal programs.

LoSatSoy™ can play a significant role in meeting dietary requirements for mayonnaise, salad dressing and the liquid oil portion of margarine.

The USDA should be commended for its pioneering efforts to provide LoSatSoy™ through the school lunch and other programs.

High oleic soybean oil also offers tremendous potential for improving the healthfulness of fried foods. We estimate over 50 percent of all soybean oil consumed is partially hydrogenated, largely to improve stability of the oil in

commercial fryers or in shelf-stable foods. High oleic soybean oil is inherently stable without hydrogenation. Optimum is working with the United Soybean Board to create greater awareness of the benefits from this new soyoil.

Optimum Quality Grains also is introducing high sucrose soybeans that offer improved flavor and digestibility of soymilk and other soy food products. High sucrose soybeans lack the indigestible carbohydrates stachyose and raffinose that can cause abdominal discomfort and gas.

Consumers have often sacrificed flavor or eating enjoyment to achieve a healthier diet. By improving the nutritional profiles of foods and food ingredients without sacrificing taste or texture, we are eliminating barriers to more healthful diets. Consumers will be able to obtain the benefits of improved oil profiles and the natural benefits of soy foods while satisfying their taste and texture preferences.

Our purpose at Optimum is to bring superior ingredients from the existing agricultural system to consumers around the world. Food companies respond to consumer demands for flavor, variety and convenience in the foods they eat, and now with the advances being made to improve ingredient oils and proteins, these foods can offer better nutrition, as well.

Agriculture is poised to respond to these new demands – creating new opportunities for producers, processors, and consumers.

Agricultural systems in place today are not customer driven, but cost driven. The marketplace defends this cheap food paradigm by saying that the customer is unwilling to spend more for healthier products. But, these new ingredients will cost more than the low priced commodities they will replace.

Numerous studies have shown that consumers are eager to spend more for products that more closely meet their needs. Consumers pay for quality in clothes they wear, cars they drive, and the computers they buy. They purchase health club memberships to improve their condition and health.

What rationale exists that says consumers will not also buy healthier food if given the choice and if it still tastes great?

Customer-driven innovation -- that is the paradigm that must drive all of agriculture in the new millennium. The technologies are available to improve

our feed and food ingredients and to produce and deliver these improvements through today's commodity systems.

We can offer consumers new choices for flavor, variety, convenience, nutrition and health in foods they eat. By improving the nutritional quality of food, we can improve the quality of life for the consumers we in business depend on.

--Thank you

Small Planet Foods

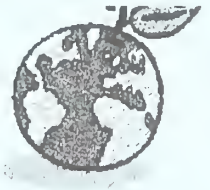
Organic Food Marketing Trends

presented to

Agricultural Outlook Forum '98

February 23, 1998

Agenda



Small Planet Foods

1. Quarter-Century Perspective on the Organic Industry.

2. Six Forces Driving Organic Growth.

3. Key Priorities Looking to the Future.

Quarter-Century Perspective on the Organic Food Industry

Small Planet Foods

- 1972 to 1998 = Phenomenal changes:
  - → Organic agricultural scale, practices, professionalism.
  - → Range and excellence of organic foods.
  - → Mainstream interest and acceptance.

- The road from anti-business to embrace of business:
  - → Conventional farmers are friends and allies, not enemies, to the organic movement.
  - → However, many organic Ag advocates and conventional Ag advocates still mistrust each other.

- National Organic Standards mark a "coming of age":
  - → Organic is integral part of Ag and food industry.
  - → Organic principles have moved from the fringe closer to the center of the national agenda in Ag and food.

6 Forces Driving Growth in the Organic Industry

Small Planet Foods

I. Environmental Awareness.

II. Relationship Between Diet & Health.

III. Declining Cost of Organic Food Production.

IV. "Mainstreaming" of Organic Consumers, Products and Retailers.

V. Worldwide Harmonization of Organic Standards.

VI. Capital Investments from Financial Community.

6 Forces Driving Growth in the Organic Industry

Small Planet Foods

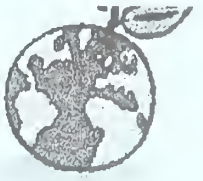
I. Environmental Awareness.

- The price we pay for food does not reflect true cost of production.

- Environmental costs of agriculture are deferred to future generations for payment.

- Assumption: Informed and concerned consumers will associate sustainable & organic farming with the solution to the above problems. Increased education will accelerate this trend.

6 Forces Driving Growth in the Organic Industry



Small Planet Foods

II. Relationship Between Diet & Health.

- Many major health problems are linked directly to diet.

- As health costs explode, increasing attention will be focused on preventative changes in diet and health.

- According to former Surgeon General C. Everett Koop: "Good diet, prevention and health promotion can postpone 79% of all premature deaths, while traditional medicine postpones no more than 15%."

- Assumption: Natural and Organic Foods will benefit substantially from increased awareness of the link between diet and health.

6 Forces Driving Growth in the Organic Industry

Small Planet Foods

III. Declining Cost of Organic Food Production.

- Increased awareness and trial of organic foods will increase sales and production.
- "Label Cancellation" will withdraw many ag. chemicals from the market, forcing farmers to consider alternative growing methods including organic farming.
- Advances in organic farming technology will increase the availability and use of bio-control of insects and disease.
- Larger, more established food companies will enter the organic food business.
- Distribution & Freight costs will decline as industry volumes approach critical thresholds.

6 Forces Driving Growth in the Organic Industry

Small Planet Foods

IV. "Mainstreaming" of Organic Consumers, Products and Retailers.

A. Consumer Trends.

- Current consumers, especially Baby Boomers, are more aware of the links between diet, health, agriculture and the environment.
- As shown in the recent Hartman - New Hope study, a healthy % of consumers are "Organically Involved" or "Organically Attracted."
- Consumer perceptions of "Organic" vary widely:
  - →For large % of consumers, "organic" is linked with simple, qualitative ideas & benefits.
  - →A much smaller % knows specifics about organic foods:

6 Forces Driving Growth in the Organic Industry

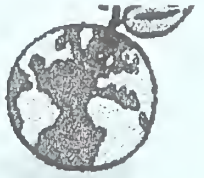
Small Planet Foods

IV. "Mainstreaming" of Organic Consumers, Products and Retailers (cont'd).

B. Organic Products have Improved Greatly.

- Taste is much better than before.
  - →Much more innovation
  - →Better & more consistent supply.
  - →Better R&D and Food Science technology.
- Packaging, Graphics, Brand Positioning, etc. have generally become more mainstream in appeal.
- Prices gaps between organic and conventional foods have narrowed considerably:
  - →Price gaps vary greatly by category.
  - →As further narrowing of price gaps occurs, other categories will progress from niche appeal to mainstream appeal.

6 Forces Driving Growth in the Organic Industry



Small Planet Foods

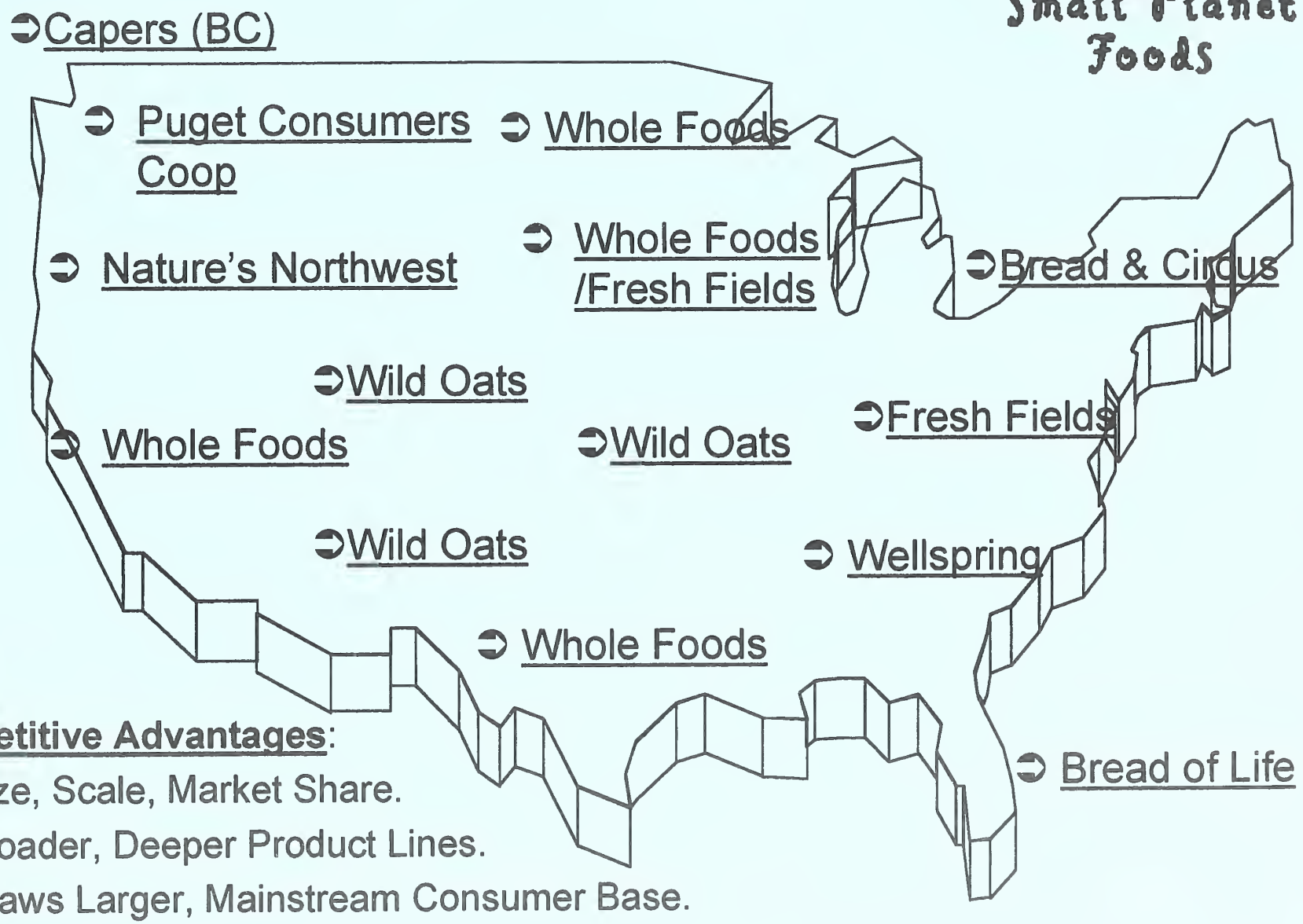
IV. "Mainstreaming" of Organic Consumers, Products and Retailers (cont'd).

C. Growth of Retail Outlets for Organic Products.

- ➲ Major natural food retailers are expanding stores and markets.
- ➲ Larger, newer natural foods stores have brighter, friendlier, more mainstream layouts.
- ➲ Major grocery chains are entering the organic category in order to compete with natural foods retailers.
- ➲ Larger, newer natural foods stores feature more frozen freezer display space.
- ➲ Organic products are gaining distribution in conventional grocery retailers.

Growth of Major Natural Food Chains

Small Planet Foods



Competitive Advantages:

1. Size, Scale, Market Share.
2. Broader, Deeper Product Lines.
3. Draws Larger, Mainstream Consumer Base.
4. Advanced Systems & Operations.

Case Study - Whole Foods Markets

Small Planet Foods

A. Financial Performance:

	1991	1997	% Chg
Sales (MM)	$92.5	$1,100	+ 1108%
Net Profit (MM)	$1.6	$26.6	+ 1563%
# Regions	2	8	+ 300%
"Team Members"	1,102	11,268	+ 923%
Donations	$63,000	$1.3 MM	+ 2000%

Whole Foods Market - cont'd

Small Planet Foods

B. Quality Standards:

"We feature and prepare foods that are free of artificial sweeteners, colors, flavors and preservatives.

We actively seek out and support sources of organically-grown foods.

We feature seafood, poultry and meat that are free of added growth hormones, antibiotics, nitrates or other chemicals.

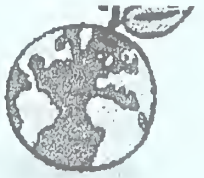
We Feature grains and grain products that have not been bleached or bromated.

We do not sell food that has been irradiated.

We sell only household and personal products that have been proven safe through non-animal testing methods."

Source: Company Financial Reports

6 Forces Driving Growth in the Organic Industry



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V. Worldwide Harmonization of Organic Standards.

- United States: Organic Food Production Act of 1990.
- World Health Organization (U.N.): Development of Organic Standards in the Codex Alimentarius Commission.
- European Economic Community.
- International Federation of Organic Food Movements.
- Assumption: Harmonization of world standards can strengthen and authenticate organic declarations and claims, giving consumers world-wide a clearer understanding of the benefits of organic food.

6 Forces Driving Growth in the Organic Industry

Small Planet Foods

VI. Capital Investments from Financial Community.

- Organic & natural products industry is now large enough to generate considerable interest from major financial investors.

- Financial investors have made financial commitments in several prominent organic and natural foods companies:

- Capital inflow from investors has significantly spurred growth for the companies in question.

- Financial investments have raised the overall visibility of and interest in the industry.

Key Priorities Looking to the Future

Small Planet Foods

- Scientific Validation of Organic Benefits:
  - →Water & Soil Quality.
  - →Pesticide Safety.
  - →Food Safety.

- More & Better Consumer Communications:
  - ↳to bring in a larger consumer base.
  - →Advertising.
  - →Public Relations.
  - →Industry-wide ads & education programs.
  - →Consistent organic standards in keeping with consumer expectations.

- Cost of Goods Improvements:
  - ↳to lower price gap vs. conventional foods.
  - →Organic Ag. research.
  - →Manufacturing infrastructure.

- Continues Quality Improvements and innovation:
  - →Better quality assurance.
  - →Higher and more consistent raw product specifications.
  - →Innovation, newest trends, consumer behavior, etc.

Agricultural Outlook Forum For Release: Monday, February 23, 1998

HYPOXIA: A GLOBAL PERSPECTIVE

by

Robert J. Diaz
Professor of Marine Science
Virginia Institute of Marine Science
College of William and Mary

A review of literature pertaining to ecological effects of hypoxia and anoxia revealed that the oxygen budgets for major coastal ecosystems around the world have been adversely affected mainly through the process of eutrophication, which acts as an accelerant or enhancing factor to the development of hypoxia and anoxia. All of these ecosystems have reported some type of monotonic decline in dissolved oxygen levels through time. In many of these systems there is a strong correlation between human activities and declining dissolved oxygen (for example: Gulf of Mexico, TX-LA; Northern Adriatic Sea, Italy-Croatia; Kattegat, Sweden-Denmark). In others the linkage of human activity to hypoxia are less obvious (for example: Chesapeake Bay, MD-VA; Saanich Inlet, British Columbia; Port Hacking, Australia). Many ecosystems now severely stressed by hypoxia appear to be near or at a threshold of imminent collapse (loss of fisheries, loss of biodiversity, alteration of food webs). The northern Gulf of Mexico may be typical of these severely stressed ecosystems that are on the edge, currently burdened with sever annual hypoxia. Over the last several decades this hypoxia, popularly know as the "dead zone", has become a dominant forcing function in the northern Gulf of Mexico controlling the population dynamics of both benthic and pelagic species, and is also implicated as an agent in the decline of fisheries stocks. The Black Sea is typical of ecosystems that have experienced hypoxia related collapsed of fisheries. Since the 1960's increasing hypoxia and anoxia have been blamed for the replacement of the highly valued demersal fish species with less desirable planktic omnivores. Of the 26 commercial species fished in the 1960's only 6 still support a fishery.

It is clear that no other environmental variable of such ecological importance to estuarine and coastal marine ecosystems around the world has changed so drastically, in such a short period of time, as dissolved oxygen. While hypoxic and anoxic environments have existed through geological time, their occurrence in estuarine and coastal areas clearly are rapidly increasing, most likely accelerated by human activities.

The importance of oxygen as an ecological factor for maintaining populations, of fisheries related species, can not be over emphasized. The seriousness of hypoxia and anoxia as environmental issues that must be effectively dealt now is best expressed by the motto of the American Lung Association: "If you can not breath, nothing else matters."

Hypoxia - what is it?

Oxygen is necessary to sustain the life of all fishes and invertebrates. In aquatic environments, oxygen from air dissolves into water and supplies the respiration needs of all animals, including those that swim or move about the bottom and those that have a sedentary life. Once dissolved into surface waters, the normal condition is for dissolved oxygen to be mixed down into bottom waters. When the supply of oxygen to the bottom is cut off or the consumption rate exceeds resupply, oxygen concentrations become to low to sustain animal life. This condition of low dissolved oxygen is know as hypoxia. The point at which various animals suffocate varies but generally effects start to appear when oxygen drops below 2 ml O2/l, for sea water this is only about 25% of what it should be. As a point of reference, air is about 200 ml O2/l. Anoxia is the complete absence of oxygen. The two principal factors that lead to the development of hypoxia, sometimes leading to anoxia, are water column stratification that isolates the bottom water from exchange with oxygen rich surface water and decomposition organic matter in the bottom water that reduces oxygen levels.

The link to nutrients and eutrophication

The increasing input of anthropogenic nutrients to many coastal areas over the last several decades has been suggested as the main contributor to more recently declining trends in bottom water oxygen concentrations around the world. Many studies have demonstrated a correlation through time between population growth, increased nutrient discharges, increased primary production in coastal areas, and finally, increased occurrence of hypoxia and anoxia. The Gulf of Trieste, Northern Adriatic Sea, is a good example of this connection. Oxygen measurements from early in this century indicated that oxygen concentrations in bottom waters were always high. The current state of sever annual hypoxia in this region has been reached gradually over a period of about 25 years as a direct result of increased sedimentation of organic matter from phytoplankton blooms fueled by excess nutrients coming out of the Po River, Italy.

The global picture

Up to the 1950's, reports of mass mortality of marine animals caused by lack of oxygen were limited to systems that already had histories of oxygen stress, such as Mobil Bay, AL. Starting in the 1960's the number of systems reporting hypoxia related problems increased. A summary of coastal bays and seas that are experiencing excess nutrient related hypoxia is presented in Table I. Details of events that lead to development of hypoxia in these systems will be discussed in the presentation.

Conclusions

Oxygen deficiency (hypoxia and anoxia) may very well be the most wide-spread anthropogenically induced deleterious effect in estuarine and marine environments around the world that causes mortality of bottom dwelling fauna, including fisheries species. Over the last 15 to 20 years the number of coastal areas with seasonal hypoxia in the bottom water is spreading rapidly and the main cause for this is suggested to be delivery of excess nutrient to the system, eutrophication. A future global warming may accelerate these effects and enlarge the areas that are affected.

TABLE I

Summary of benthic effects for hypoxic systems around the world. Several of these systems also experience anoxia. In the case of many fjords there is an anoxic zone within which no macrofauna occur. The absence of fauna from these anoxic zones is not considered a community response but a consequence of stable anoxia. Hypoxia is typed as: **Aperiodic**, events that are known to occur at irregular intervals greater than a year; **Periodic**, events occurring at regular intervals shorter than a year; **Seasonal**, yearly events related to summer or autumnal stratification; **Persistent**, year round hypoxia. Levels of hypoxia are: **Moderate**, oxygen decline to about 0.5 ml/l; **Severe**, decline to near anoxic levels, could also become anoxic. Time trends of hypoxia, area and or intensity, for the systems are: - = Improving conditions; + = Gradually increasing; ++ = Rapidly increasing; 0 = Stable; . = No temporal data. Benthic community response is categorized as: **None**, communities appear similar before and after hypoxic event; **Mortality**, moderate reductions of populations, many species survive; **Mass Mort.**, drastic reduction or elimination of the benthos. Benthic recovery is: **No Change**, dynamics appear unrelated to hypoxia; **Some**, recolonization occurs but community does not return to prehypoxic structure; **Slow**, gradual return of community structure taking more than a year; **Annual**, recolonization and return of community structure within a year.

System	Hypoxia Type	Hypoxia Level	Time Trends	Fauna Response	Fauna Recovery	Fisheries Response
New York Bight, New Jersey	Aperiodic	Severe	.	Mass Mort.	Slow	Surf Clam losses
Shallow Texas Shelf	Aperiodic	Severe	+	Mass Mort.	Slow	Stressed
Deep Texas Shelf	Aperiodic	Moderate	0?	Mortality	Annual	Stressed
German Bight, North Sea	Aperiodic	Mod./Severe	+	Mass Mort.	Annual	
Sommone Bay, France	Aperiodic	Severe	+?	Mass Mort.	Slow	Collapse of Cockle fishery
North Sea, W. Denmark	Aperiodic	Severe	+	Mortality	Annual	Stressed
New Zeland	Aperiodic	Severe	.	Mass Mort.	.	Stressed
York River, Virginia	Periodic	Mod./Severe	0	None	No Change	Stressed
Rappahannock River, Virginia	Periodic	Severe	+	Mortality	Annual	Stressed
Long Island Sound, New York	Seasonal	Severe	+	?	?	Lobsters displaced
Main Chesapeake Bay, Maryland	Seasonal	Severe	+	Mortality	Annual	Stressed
Pamlico River, North Carolina	Seasonal	Severe	.	Mass Mort.	Annual	.
Mobile Bay, Alabama	Seasonal	Severe	0	Mass Mort.	?	Stressed
Hillsborough Bay, Florida	Seasonal	Severe	.	Mass Mort.	Annual	.
Perdido Bay, Florida	Seasonal	Severe	.	Mass Mort.	Annual	.
Louisianna Shelf	Seasonal	Mod./Severe	+	Mortality	Annual	Stressed
Saanich Inlet, British Columbia	Seasonal	Mod./Severe	0	Mortality	Annual	.
Bornholm Basin, S. Baltic	Seasonal	Mod./Severe	+*	Mass Mort.	Slow	.
Kiel Bay, Germany	Seasonal	Severe	+	Mass Mort.	Annual	Stressed
German Bight, North Sea	Seasonal	Severe	+?	Mortality	Annual	Stressed
Lough Ine, Scotland	Seasonal	Severe	0	Mass Mort.	Annual	.
Århus Bay, Denmark	Seasonal	Severe	+	Mass Mort.	Slow	.
Limfjord, Denmark	Seasonal	Severe	+	Mass Mort.	Annual	None
Kattegat, Sweden-Denmark	Seasonal	Mod./Severe	++	Mass Mort.	Slow	Collapse Norway Lobster
Laholm Bay, Sweden	Seasonal	Severe	++	Mortality	Annual	Stressed
Gullmarsfjord, Sweden	Seasonal	Severe	+	Mass Mort.	Annual	Stressed
Swedish West Coast Fjords	Seasonal	Severe	++	Mortality	Some	Stressed
Oslofjord, Norway	Seasonal	Mod./Severe	+	Mortality	Annual	Reduced
Gulf of Trieste, Adriatic	Seasonal	Severe	++	Mass Mort.	Slow	Stressed
Elefsis Bay, Aegean Sea	Seasonal	Severe	.	Mass Mort.	Annual	.
Black Sea NW Shelf	Seasonal	Severe	++	Mass Mort.	Annual	Reduced
Port Hacking, Australia	Seasonal	Severe	.	Mortality	Annual	.
Tolo Harbor, Hong Kong	Seasonal	Severe	.	Mass Mort.	Annual	.
Seto Inland Sea, Japan	Seasonal	Moderate	.	Mortality	Annual	.
Tome Cove, Japan	Seasonal	Severe	.	Mortality	Annual	.
Japan, All Major Harbors	Seasonal	Severe	++	Mass Mort.	?	Reduced
Yellow Sea, China	Seasonal	Severe	?	?	?	.
Agean Sea	Seasonal	Severe	?	?	?	.
Sea of Azov	Seasonal	Severe	+	Mass Mort.	?	Reduced
Loch Creran, Scotland	Persistent	Severe	0	Mass Mort.	No Change	.
□						
Byfjord, Sweden	Persistent	Severe	0	Mortality	Some	Pelagic only
Idefjord, Sweden-Norway	Persistent	Severe	+#	Mortality	Some	.
Baltic Sea, Central	Persistent	Severe	++	Mortality	Some	Stressed
Gulf of Finland, Deep	Persistent	Mod./Severe	-	Reduced	Slow	.
Black Sea (except NW shelf)	Persistent	Severe	+	No Benthos	No Change	Pelagic only
Caspian Sea	Persistent	Mod./Severe	0	Mortality	Some?	.
Fosa de Cariaco, Venezuela	Persistent	Severe	.	Reduced	No Change	.

* These systems are currently in a persistent hypoxic state.

Recent imporvements in oxygen concentrations due to pollution abatement.

OUTLOOK FOR DAIRY

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Nothing very dramatic is expected to happen to either the supply or demand for milk and dairy products in 1998, following on the heels of a year more notable for what did not happen than for what did. In 1998, milk production is expected to be near the 1997 level, while dairy demand grows moderately. With no clear sense of market direction, dairy prices may well stay volatile but are projected to average only slightly higher than in 1997.

Prices of concentrate feeds and forages may ease in 1998 but will stay relatively high through at least most of the year. Expected returns are not likely to upset the balanced trend and structural adjustments that have held milk output fundamentally stable in recent years. Sluggish growth in milk per cow is expected to only barely outweigh a 1-percent decline in milk cow numbers.

Continued economic growth is expected to sustain the good, but not spectacular, dairy demand of recent years. However, reactions to prices above those of earlier in the nineties will pare away some of the potential growth in commercial use. In addition, large stocks of nonfat dry milk and the probable spring lapse in exports under the Dairy Export Incentive Program (DEIP) will weaken price rises.

Milk Production Stagnant

In 1997, milk producers handled very tight supplies of dairy-quality forage better, avoiding a repeat of 1996's spring collapse in milk per cow, and their cows benefitted from relatively favorable summer weather. Other than these two factors, milk production in 1997 was very similar to 1995 and 1996. The almost 157 billion pounds produced last year was less than 1 percent more than in 1995, although more than 1 percent larger than in 1996.

Milk-feed price relationships help explain some of this stability in milk output. The milk-feed ratio has spent most of recent years in the range normally associated with below-trend growth in milk per cow. Correspondingly, milk per cow, except for the direct and indirect effects of weather, has grown quite modestly. Although the milk-feed ratio will be more favorable during part of 1998, the 1998 average is projected to be a moderately unfavorable 1.6--not much incentive to boost grain feeding and milk per cow.

Returns over concentrate costs in 1997 were higher than they had been in the early nineties but fell about 11 percent from the strong 1996 returns. The stronger returns of 1996-97 did not do

much to slow declines in milk cow numbers. The increases were insufficient to significantly alter the position of those dairy farms under long-term income stress and many of them continued to leave dairying. Similarly, these higher returns have not yet unleashed much expansion by stronger producers, as forage supplies and other factors have deterred growth. Returns over concentrate costs are expected to rise slightly in 1998. The cumulative effects of three years of higher returns may start to slow cow number declines by yearend.

Despite fairly large alfalfa production in recent years, supplies of dairy-quality hay have been very tight. Quality problems have been widespread in each of the last three crops, leaving only minimal stocks of good hay. Alfalfa prices reached record levels in 1997, even compared with the relatively high milk or concentrate feed prices, and had a substantial impact on the returns of those producers buying hay-- if they were able to find acceptable hay. Many more farmers were affected by the spotty quality of their homegrown alfalfa. Overall, lack of enough good forage trimmed growth in milk per cow and disrupted expansion plans. Conditions would have been much worse if the last two silage crops had not been good. Even a bumper 1998 alfalfa harvest cannot greatly ease the dairy forage problem until late 1998, although the drop in Asian alfalfa demand and the relatively mild winter has eroded prices recently.

Firm Use Seen

Dairy demand continues to benefit from the strong economy. Commercial use comparisons were strongly affected by much different pipeline stock changes in 1996 and 1997, particularly in the middle quarters. On a milkfat basis, commercial use rose almost 1 percent in 1997. Sales of dairy products on a skim solids basis were a little sluggish, slipping fractionally. Skim solids sales appeared to be more affected by delayed reactions to the high prices of 1996, and aggressive use of the DEIP pulled supplies away from domestic users.

Continued economic growth and little or no increase in retail dairy prices in 1998 should boost commercial use of dairy products. Sales of skim solids are projected to rise about 2 percent, while milkfat sales are expected to increase 1 percent again. The brisk apparent demand for milkfat during the second half of 1997 and early 1998 implies that the rise in milkfat sales would be considerably larger if supplies were large enough to avoid substantially higher milkfat prices.

Commercial stocks at the start of 1998 were close to a year earlier. Comparisons of recent butter and particularly cheese data with earlier years are not straightforward because they include warehouses that did not report in earlier years--a difference of 0.5-1.0 billion pounds milk equivalent. On January 1, holdings of butter and American varieties of cheese were moderate and inventories of most other products were tight. The only exception was continued burdensome stocks of nonfat dry milk.

International Dairy Markets Softening

International butter prices rose during most of 1997. Demand for imports was fairly brisk, while consumption increases in some exporting countries trimmed export supplies. Demand for nonfat dry milk was somewhat weaker, in part because Mexico and Algeria were importing less. Although prices generally trended downward during 1997, a modest reversal occurred during the second half. Large importers were again active and offerings were seasonally smaller.

Since November however, prices of both products began to slide. Asian demand has weakened dramatically and even some deals completed before the crisis probably will be canceled. The strength of the U. S. dollar also has trimmed prices. Lastly, New Zealand and Australia have been more aggressively selling products. During the first half of their season, these countries were conservative about making commitments because of the uncertain effects of El Niño weather. Although conditions have been dry, there is no longer the same potential for sharp production drops.

There probably will be enough international market demand to push DEIP exports to amounts allowed under the WTO, but reaching the limits for all products is not certain. Weakness in Asia may give buyers the upper hand in negotiations, slowing the sales pace. Domestic supply commitments may not be easy to obtain, particularly for products containing milkfat.

Contract activity under the DEIP slowed substantially in early 1998 after being brisk during the second half of 1997. The only allocation for nonfat dry milk that remains unfilled for the July 1997-June 1998 contract year is for less than 10,000 tons going to Latin America. The WTO limit may well be reached by this spring, with no new contracts negotiated until after the flush milk production season. Exports of butter and milkfat under the DEIP probably will not be filled because of the lack of domestic supplies. Contract activity during the second half of 1998 probably will be at a pace roughly corresponding to the WTO limits for most products, unless domestic markets are tighter than expected.

Price Volatility To Remain

Without a clearcut sense of the direction of production and use changes, milk and dairy product prices likely will continue to be pushed around by small changes in market fundamentals or pipeline stocking. If milk output stays near or above a year earlier as expected, the seasonal buildup in production should overcome the current price strength and drop spring and summer prices of cheese and milk significantly below current levels. However, strong butter prices (which may not weaken) have effectively isolated cheese prices from the nonfat dry milk market--the major weak spot in dairy markets. Even if the seasonal drop in cheese prices is fairly sharp, farm milk prices probably will stay above a year earlier during the first half of 1998.

For all of 1998, farm milk prices are projected to average only slightly above 1997's $13.38 per cwt. However, odds probably are greater that prices will average above the projection than

below. Production faltering because of forage problems or lack of farms expanding and stronger-than-expected demand represent two quite plausible scenarios that would generate much higher milk prices.

Issues for the Intermediate Outlook

Record-high alfalfa hay prices did not suddenly appear in 1997. Relative to all farm prices, alfalfa hay prices have trended upward, even though production has remained about the same. The pattern is most pronounced west of the Rocky Mountains. Western alfalfa prices have moved upward despite gradual increases in regional alfalfa production. Price increases for high quality alfalfa hay probably have been greater than average, since some evidence indicates that quality premiums have grown.

The factors behind the large increases in Western alfalfa prices are not all known. Larger exports certainly were a factor as Japan, Korea, and Mexico have become important buyers of top quality hay. Horses certainly are strong competition for high quality hay, although it is not clear that horse demand has grown. Less beef feeding in the West probably has lessened competition somewhat, although beef demand may have a greater role in prices of lower quality hay. Much of the uptrend in alfalfa prices appears to be related to the region's growth in milk production. Milk cows, exports, and horses probably now absorb almost all of the "dairy" quality alfalfa currently being produced in the region.

The West can and is expanding alfalfa production. Recent prices make alfalfa much more competitive for land and water. In 1997, average value of California's production exceeded $900 per acre, not exactly the "low-value" crop often depicted. However, long-term price prospects are for Western hay prices that will be significantly higher than in the past, even if prices slip from the 1997 peak. Prices within the region have become much more integrated as brokers comb the region for relative bargains. Tightness in Western hay markets even appears to be spilling over into the hay markets of the Northern Plains. The West is becoming a potential customer, rather than competitor, for Northern Plains hay sellers.

Alfalfa price increases will have several implications for the dairy industry, particularly in the West. Growth in Western production will not be as easy as in the past. Relative costs of milk production are likely to rise as producers either pay the price for top quality hay or learn to incorporate lower quality forages. Hay prices definitely will not stop development of the Western dairy industry, but they may well slow it. Also, increasing numbers of Western farmers may look east of the mountains to start new dairy operations.

Higher alfalfa prices outside the West probably will have less impact. They may even make it easier to establish large, industrial-style dairy farms if they stimulate development of commercial hay markets in northern dairy areas. Dairy farmers in all areas probably will have to adjust their thinking about dairy rations, as alfalfa may not be a cheap source of nutrients to be fed to the

limit of the cow's capacity.

Development of new large dairy herds appears to have slowed recently--despite higher returns in 1996-97. The longer-term increase in these operations in the North indicates that such farms can be competitive, even though the largest size category in the NASS data includes more than just the "new-style" operations. The number of large operations has grown in the Lake States, Northeast, and West, while slipping in other areas. In the core dairy regions, growth in the number of large farms, particularly those larger than 400 cows, seems inevitable in light of economies in investment and efficiencies of specialization of labor and management.

Expansion of large farm numbers was relatively restrained in much of 1996 and 1997 and is expected to be in much of 1998, partly because of forage problems and milk price volatility. Starting a new operation or greatly expanding an existing farm sharply boosts a producer's financial vulnerability, even for the best managers. Risks from the lack of an assured supply of high quality forage for expansion were particularly important recently because farmers could not rely on being able to find acceptable hay if they fell short. Similarly, the recent volatility in milk prices probably deterred some expansions. Even though prices wound up averaging higher, the added risk may have been too much.

These expansion-minded producers will not be denied forever. A major uncertainty for the pattern of milk production and prices in the next few years is the pace of such growth. A surge of expansions (possibly even starting in late 1998) might drop milk prices significantly lower than expected during the next few years. On the other hand, continued conservatism might mean the exit of other farms will result in stagnant or even declining milk output and rising milk prices.

Slower expansion in the number of western dairy farms may be more persistent. In addition to the changes in the western alfalfa markets, there may remain fewer places in the region where milk production can mushroom into a dairy center such as Roswell NM or Twin Falls ID. Future emergence of new areas may come at the expense of established areas.

Lastly, the growth of large dairy farms increasingly will be affected by environmental restrictions on large units. The days of dairies being relatively uninhibited, compared with other animal operations, clearly are over. However, discussion of this topic is best left to the experts who will follow.

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THE OUTLOOK FOR LIVESTOCK AND POULTRY

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Record grain costs in 1996 and fluctuating export markets have kept livestock producers in an uncertain planning environment. Adjustments made in production plans over the last two years have been dominated by reactions to random events rather than systematic changes based on long term market conditions. Due to a hot dry summer in 1995 corn prices peaked in the 1995/96 crop marketing year. Soybean meal prices increased substantially also, but they did not peak until the 1996/97 crop marketing year. Forage quality and availability have also been poor during the last couple of years. Feed costs were the highest during the summer of 1996, but continued at relatively high levels through 1997. Export market disruptions have included export bans and tariff collection changes in Russia and the bird flu in Hong Kong for poultry. For red meats export fluctuations have been caused by food safety scares and tariff fluctuations in Japan, E-coli testing in Korea, and by disease problems in the hogs of export competitor Taiwan. More recently the Asian financial market crisis has brought reductions in purchasing power and uncertainty about the effect on U.S. exports.

Producer adjustments led to beef production falling below a year earlier starting in the second half of 1996 and continuing the decline in the first half of 1997, while pork production was below a year earlier for all of 1996 and the first half of 1997. Slower production increases for poultry began in the second quarter of 1996 and carried through all of 1997. Annual increases in beef production are not expected to return until after 2000. A much shorter biological cycle will result in pork production increases and slight poultry production expansion acceleration over the 1998-2000 period. Smaller increases in poultry production and reductions in pork production are expected after 2000 as corn prices increase and bring higher feed costs and beef production begins to increase.

Continued economic growth and declining real prices of meat will allow consumers to purchase more meat with a smaller share of disposable income over the baseline period. Declining real prices require increases in efficiency of meat production, processing, and marketing if profitability is to be maintained. Poultry's generally lower price is expected to enhance its share of meat consumption, with poultry consumption on a retail weight basis projected to exceed red meat consumption in 2004. Continued consolidation of firms at all levels in the meat industry are expected as more efficient firms acquire those that are not adjusting rapidly enough or as less efficient firms are eliminated.

Beef Production Declining Through 2000

Sharply higher corn and hay prices in the 1995/96 crop year led to declines in feeder cattle prices during late 1995 and 1996. Prospects for lower returns for cow calf operations brought increased beef cow marketings in the fall of 1995. Beef cow marketings peaked in 1996 but female stock slaughtering continued quite strong in 1997. Placements of cattle on feed were also disrupted by the high feed costs. Feeder cattle were kept on pasture for longer periods, where possible, in order to reduce the amount of time they would have to be fed with high priced grains. This meant more cattle than ordinarily would have been available were placed in feedlots during 1997. Higher than expected placements of heifers, in the second half of 1997, also kept feedlot placements quite high.

Reductions in cattle inventories due to smaller calf crops is expected to continue through 1999. Recovery in cattle inventories is expected to begin in 2000 with numbers reaching 102 million by 2007. This would continue a trend of lower peaks in cattle numbers in each production cycle since the peak in cattle numbers in 1975 at 132 million head. Increasing slaughter weights and higher percentages of calves entering feed lots have offset most of the decline in cattle numbers keeping meat production declines much smaller than cattle number declines.

Feeder cattle are expected to spend more time on pasture in the future. This will result in heavier cattle entering the feedlot and continued increases in cattle weights at slaughter. More efficient use of feed and increased availability of pasture with smaller cow numbers are driving this trend.

The beef market is becoming increasingly segmented. Highly marbled choice and prime cuts are going primarily to exports and restaurants, while select cuts are being sold mostly at retail and lean beef is being imported for use in ground products. This trend could provide some opportunities for producers to coordinate production with product traits that processors require, in order to obtain price premiums. These arrangements are relatively rare at this time but are increasing and may have to increase in the future if increased efficiency of beef production is to be realized.

The financial crisis in Asia and tightening supplies of beef in the U.S. during 1998-2000 will keep the U.S. as a net importer of beef until the last half of the baseline period. Asia is the primary export market taking nearly two-thirds of U.S. exports in 1997. Canada and Mexico each took between 10 and 15 percent of exports. They are expected to increase purchases of U.S. beef as the Asian markets shrink in 1998.

Pork Production To Increase Through 2000

Hog producers had already begun to decrease production in the last half of 1995 due to low hog prices in late 1994, before the high feed costs became a factor. High feed costs extended the reduction in production through the first half of 1997. Loss of small operations during the low

profitability periods and more large operations being built has changed the structure of the hog industry. More stable production, increased market coordination, and product standardization is expected with the larger operations.

Very strong increases in production are taking place now and are expected to continue through the third quarter of 1998. More moderate increases in production are expected to continue in 1999 and 2000. Three years of small production declines are expected in 2001-2003 and then small production increases for the rest of the baseline period.

Per capita consumption of pork on a retail weight basis is expected to increase from last year's 49 pounds per person to about 54 pounds by 2000, the highest since 1981. Production declines and increases less than the rate of population growth in later years are expected to bring per capita consumption back to 49 pounds per capita.

Pork exports are expected to double over the baseline period, reaching about 2 billion pounds by 2007. Japan took nearly half of U.S. pork exports in 1997. Canada and Mexico are expected to import more product as sales to Japan are expected to soften. Pork imports are expected to decline slowly, continuing the current trend.

Broiler Production Increasing More Slowly

High feed costs in late 1995 and 1996 and export market disruptions in early 1996 brought slower broiler production increases starting in the second quarter of 1996. Continued relatively high feed costs and increased enforcement of tariff collections on poultry imports in Russia kept producers cautious in 1997 and led to the smallest broiler production increase since 1983. Slightly stronger increases in production are projected for 1998-2000 as beef production declines accelerate and pork production increases moderate after 1998.

Increases in broiler production are expected to run much below the 40 year average of 5-6 percent per year after the year 2000. More attention seems to be being shifted to value added product marketing and development of home meal replacement options than to increasing the quantity of commodity product that is being produced for retail or fast food outlets. Maintaining production increases and increasing market share becomes harder as total poultry approaches surpassing red meat consumption on a retail weight basis in 2004.

After two years of low net returns to turkey producers and with the prospect of 9 percent higher pork production in 1998 turkey production is expected to decline in 1998. This would be the first production decline since 1982. Competition with sharply lower priced pork trimmings in export markets and with hams on the domestic market is expected to keep pressure on turkey prices. Turkey production increases later in the forecast period are expected to about keep pace with population increases and keep per capita turkey consumption relatively constant at 18-19 pounds per capita.

Egg production is currently fairly profitable and egg production is increasing. Per capita egg consumption reached the highest level since 1988 last year, 239 eggs per person. Increases in egg product consumption of 3-4 eggs per person more than offset declines in shell egg consumption of 1-2 eggs in 1997. Table egg production increases are expected to slightly outpace population increases and bring per capita egg consumption to 245 eggs per person by 2007. The trend to increased use of eggs as ingredients in further processed food products and reduced consumption of shell eggs is expected to continue through the baseline period.

Poultry Exports To Continue Increasing

Poultry exports are expected to continue increasing through the baseline period, but at a much slower pace than in the mid 1990s. The Asian crisis is expected to affect poultry exports less than for the red meats since relatively low valued poultry items are exported. Also Asia does not represent as large a share of U.S. export sales at about 25 percent. Russia leads for broiler sales with over 40 percent, while Mexico takes over 30 percent of turkey exports.

AN FDA FOOD SAFETY PROGRAM - A WESTERN GROWERS' VIEW

Jasper E. Hempel
Vice President, Government Affairs, Western Growers Association

Agriculture has always had a healthy scepticism of government and government agencies. The phrase "We are from government and we're your friends" has always been a coffee shop joke widely guffawed at by farmers across the United States. A farmer's typical view of government is one of enforcement actions, intrusions on personal and property rights, and a notion that farmers are constantly confronted by bureaucrats wanting the farmer to do everything but what the farmer does best: growing food and fiber for an increasingly hungry world. In other words, most farmers believe that government just gets in the way.

Obviously, I have painted an extreme picture; I can also point to many instances where government significantly helps agriculture. Human nature, if not a prevalent media culture, it seems, has us focus on negatives rather than positives, and so it is with food safety.

With respect to food safety and the Food and Drug Administration, our members had developed a negative perception of FDA. I know it sounds funny, but having lived through it for our members I know that typically FDA calls you on a Friday, after 5 p.m., telling you that you have contaminated products, that they want a list of all your customers that they can call to warn them about the contamination, and asking you to recall your contaminated product. In the overwhelming majority of time, you do not have an opportunity to test the alleged contaminated product yourself to verify what government has told you. In the meantime, the damage is done. Your reputation has suffered, your markets have dried up, the media has been notified, and you are in a tailspin trying to contain the crisis.

So, why has Western Growers Association, as well as other commodity organizations around the United States, seemingly bought into the FDA's food safety program if we have had such disdain for them? Why did Western Growers Association and the International Fresh-cut Produce Association develop voluntary food safety guidelines for their members in cooperation with FDA and other government agencies? There are several reasons for this turnaround:

The Centers for Disease Control's statistics over the past four or five decades reflect that production agriculture and processes related to agricultural production have contributed about 3% to all food borne outbreaks. More than 70% of food borne outbreaks are attributed to post-harvest or post-processing food handling practices. In the last 10 years that 3% has been slowly increasing too now about 7%.

In 1996, there were two E. coli outbreaks that were traced to lettuce. Around the same time, the President announced his Food Safety Initiative, and the California Department of Health Services were making inspections of fresh produce facilities. The media had jumped on the food safety bandwagon, and increasing focus was given to

fresh fruit and vegetable contribution to food borne outbreaks

WGA and IFPA decided to take a proactive stance for their respective membership. With government breathing down our neck, the media calling us, and with some retailers asking for more stringent field practices to protect them against food safety concerns, WGA and IFPA decided to develop voluntary food safety guidelines in cooperation with government! We know our fresh produce is safe. We believe that we have the finest quality of fresh fruits and vegetables grown, shipped and processed of anywhere in the world and we were not afraid to let government see us deal with the issue.

Our belief was this: If we worked with government in producing voluntary food safety guidelines we could accomplish several things. First, we could take a proactive role for our industry. We believe we have an obligation to our consumer customers to provide them the safest, most wholesome and nutritious produce we can produce; second, we could educate regulators about our industry and how safe our product is; third, we could have government oversee our efforts to ensure that we addressed what government is looking at food safety wise; and, fourth, we wanted to avoid mandatory regulations. We truly believed that cooperation in this instance was better than regulation.

So, we developed the guidelines. We formed a steering committee consisting of growers, packers, shippers and processors of fresh produce. These growers, packers, shippers and processors wrote the guidelines themselves, with review by government officials who sat at the table at every meeting we had to discuss the guidelines. We developed a mission statement which focused on minimizing microbial contamination and education. We created subcommittees who took it upon themselves to write the guidelines, and we had a scientific task force, who job it was to review the work produced to see if it was scientifically sound.

We based the guidelines on the premise that fresh produce is safe to eat. They are also designed to be practical, economical and effective. We wanted them to be a template that others in our industry could use to develop their own guidelines. And, most important, these guidelines are ever-evolving; as new technology, new science, and better food safety processes are developed we will incorporate those developments into future editions of the guidelines. We have also embarked on a strong educational campaign to bring the guidelines to our members. We have held eight workshops around California and Arizona, educating our members about the importance of the guidelines and on the critical need to implement what is contained in the guidelines.

Again, what made our effort truly unique was the fact that we cooperated and partnered with government agencies. State and federal agriculture and health agencies as well as local agricultural officials sat at the table with us. The federal officials who participated were FDA's local representatives. This point is critically important. The local, as in state or county level, officials have a better understanding of our industry than do those individuals who conduct policy work in Washington, D.C. I am not saying this to antagonize anyone, but it is a fact.

The single most important lesson we have learned out of this effort is that we can

cooperate with government on food safety or other issues if one takes a "bottom-up" approach rather than a "top-down" mandate. In other words, by sitting together in Salinas, industry and government together developed the excellent guidelines. In contrast, currently FDA is developing top-down industry-wide good agricultural practices (GAPs) which FDA wants United States agriculture to endorse and adopt. While the GAPs are based in part on the guidelines developed by WGA/IFPA and United Fresh Fruit and Vegetable Industry, I do not believe they will receive widespread acceptance precisely because they came from the top as opposed to being developed from the ground up.

Our guidelines addressed every major food safety concerns identified by government regulators. We are implementing them. Based on this cooperative effort between government and industry, our relationship could not be better! We do not hesitate to talk to our local agriculture or health officials about food safety issues; we get them resolved. We are embarking on even more exiting activities in the future because of the strong relationship we have developed with our friends in the regulator community.

In closing, let me say this. We truly appreciate the role that the Food and Drug Administration as well as USDA has taken on food safety. The President's Food Safety Initiative, increased media attention, and several food safety outbreaks attributed to fresh produce spurred our industry into action, working with government to address these issues.

Having successfully worked together on such an important program tells us that we can do so in the future. But, we strongly believe that it will only work if it starts with a bottom up rather than a top down approach. Thank you for your attention.

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ENVIRONMENTAL QUALITY, ENVIRONMENTAL REGULATION AND THE STRUCTURE OF ANIMAL AGRICULTURE

by

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To analyze whether or not environmental regulations impact the structure of animal agriculture, it is first necessary to ask "what is meant by structure?" Numerous definitions of structure exist and are commonly used to analyze dramatic changes occurring in the animal agriculture subsectors. These changes, and therefore the term *structure*, may refer to such factors as the distribution of sales, revenues, and profits; the importance of farm income as the primary family income source; concentration of production within a geographic region or by a small number of firms; degree of specialization; ownership and control of inputs and outputs; and the number and size distribution of farms (Offutt, Hoppe et al.). While each of these factors helps to evaluate changes occurring in the animal agriculture subsectors, we suggest that the crux of the economic and social debate surrounding environmental regulations and the structure of industrialized animal agriculture centers around three factors: changes in the *size of operations*, changes in the *form of vertical coordination*, and shifts in the *location of animal agriculture*. To that end, we ask the question "have environmental regulations impacted these three factors?" Furthermore, we look beyond the current structure and address the question "might environmental regulations affect the future structure of animal agriculture?"

Because we focus on three specific factors to describe structure, it is worthwhile to define what we mean by each. First, we propose that the structure of animal agriculture can be characterized by the *size of the operation*. In this sense, we are referring to the physical size of the operation defined by the number of head or acres of land, rather than defined by gross revenues or farm income. We choose to do so because we believe the social and environmental issues associated with animal agriculture are the result of the number of animals per associated land base, rather than the dollar value attached to any farm operation. In the

case of animal agriculture, issues associated with the size of the operation are closely linked to the issue of *animal density*, here defined as the number of animals per unit of land. To a large degree, the increase in animal density has been the result of increased specialization and changes in the type of vertical coordination.

Second, we use the term *form of vertical coordination* to describe changes in the type of coordinating mechanism at various stages of input supply, production and marketing. Characterizing vertical coordination as a spectrum, with cash or spot markets on the far left and complete ownership integration at the right, changes in the way that farmers and farms operate can be identified. As an illustration, one can think of a hog farmer who raises his own corn which he then feeds to his hogs and, in turn, markets the hogs at the local livestock auction. In this case, the farmer is his own feed supplier (ownership integrated between these two stages), but markets his hogs as a blind cash transaction. Alternatively, one could think of a contract pork producer who in return for a predetermined contractual fee, raises hogs owned by another party, the contractor. The contract producer provides his own land and facilities but has feed delivered to his farm by the contractor and is not involved in any marketing decisions. This scenario illustrates a case where neither spot markets (a loosely-coordinated system) nor complete ownership integration (a tightly-coordinated system) occurs, but rather the form of vertical coordination, production contracting, falls elsewhere in the spectrum. We raise the issue of form of vertical coordination, because we believe, like size of operation, it is at the base of discussions involving the structure of animal agriculture.

Finally we focus on the issue of *location of animal agriculture*. Locational changes in animal agriculture are characterized by two different types of adjustments: a) shifts of animal production between regions and b) clustering of production within a region. We focus on these two phenomena because we believe that environmental problems, both real and perceived, attributed to animal production arise from characteristics of and changes in not only how but where production takes place.

Have Environmental Regulations Impacted the Structure of Animal Agriculture?
We address this question by analyzing the effect of environmental regulations on each of the three factors used to describe the structure of animal agriculture.

Size
To begin, we raise the question of whether or not environmental regulations have impacted the size, and more specifically the movement toward larger size, of livestock and poultry farms. We conclude the answer is ambiguous and there is evidence that environmental regulations have both facilitated and hampered the movement toward larger farms.

The greatest factor driving the movement toward larger farm size has been the introduction and adoption of new technologies, that for the most part, have not been scale neutral. Improved disease control and feed programs, coupled with the movement toward confined production

operations and greater fixed investments, have led producers to increase output, lower per unit costs of production, and adjust to new sources of risk. Evaluating pork production, Good determined that hog production costs for a large, specialized farm in North Carolina were approximately 10% less than for a traditional hog farm in the Midwest. Without any significant change in overall supply, early adopters of new technologies which lower per unit costs are able to enjoy positive economic profits. As first adopters of new technologies expand production, the inevitable outcome will be an increase in overall supply leading to a decrease in market price. Therefore, marginal producers are forced to either adopt low-cost technologies, exit from the industry, or search for alternative production and marketing relationships that lower the cost of production. Harrington and Reinsel emphasize that differences in production technologies due to the adoption of technological innovations and form of vertical coordination are the driving force behind the increasing size of farms.

Recognizing that technological change has been the primary driving force toward larger farm size, what role has environmental regulation played in changing farm size? In states such as Minnesota, South Dakota, and Nebraska, where regulations require balancing manure nutrient applications to nutrient use by crops, farms are required to own or acquire the rights to apply manure on farmland. This has the potential to increase production costs as external costs of manure management are internalized. As herd size increases, diseconomies in manure management exist when land application at an *agronomic rate* is required (Martin and Zering; Hoag and Roka; Northrop and Zering). These diseconomies are primarily the result of transport and application costs and are further exaggerated when the land base is constrained. Should these diseconomies represent a significant portion of production cost, we would expect to see a movement toward smaller farms rather than larger farms, or at a minimum, a decrease in the acceleration of the movement toward large farms with a high level of animal density.

In contrast to the diseconomies associated with nutrient balancing, in states where environmental regulations reach beyond this to include permitting, certification, storage, treatment or management standards, the high fixed costs of complying with such regulatory requirements are more easily met by farms with high animal numbers (Davis et al., Bennett and Osburn). Because no immediate payoffs occur to offset upfront compliance costs, large farms are better positioned to spread these costs over a greater number of production animals. When these requirements are applied to all sizes of farms, the relative cost of compliance is much greater for small farms than for large farms. Therefore, if technological benefits and the costs of compliance favor larger farms, we would anticipate a movement toward larger farms.

Despite the evidence of differences in compliance costs for large and small animal operations, there has yet to be any *empirical* evidence that these cost differences have, in fact, been a significant cause of farm size changes. Empirical evidence exists that economies of scale and size in production are factors which are contributing to changes in farm size. However, no one to date has attempted to separate out, empirically, the relative importance of the myriad of factors contributing to the observed transition to larger farms.

Vertical Coordination

The movement toward larger farms with higher animal densities has been combined with changes in the type of coordinating mechanism used by input suppliers, farmers and packer/processors. A growing body of literature exists, both empirical and theoretical, as to why certain forms of vertical coordination occur. Within this literature, there is a general consensus that several key factors are involved in the movement from spot markets to more tightly-coordinated forms of vertical coordination such as production contracts and large-scale ownership integration.[1] These factors include reduced transaction costs, increased responsiveness to consumer demand, improved quality control (e.g., food safety, consistency, and uniformity), risk shifting and risk reduction, and production efficiencies from specialization. In addition, for many young farmers, pork production contracts have been viewed as a means to get started in farming and obtain easier access to capital (Rhodes and Grimes). It is not unheard of for lenders to offer 100% financing to pork producers who hold only a hog finishing contract as collateral.

Recognizing that there is a trend toward more tightly-vertically coordinated animal agriculture systems, what then is the relationship between environmental regulations and vertical coordination? First, as the use of production contracts increases, concerns arise over the fact that contractors control feed and animals, but manure handling costs are borne by contract growers. However, as evidenced by the actions of one major North Carolina contractor who reportedly pulled hogs from a contract grower's facilities overnight after the grower was cited for not being in compliance with environmental regulations, contractors are highly motivated to meet and in some instances exceed environmental regulations (Martin and Zering). Conversely, contractors are less motivated to include feed additives, such as phytase which has the potential to reduce the amount of phosphorus excreted by broilers and swine, when such additives increase feed cost to the contractor.

Proposed federal legislation aims to make animal owners, regardless of whether or not these individuals are physically involved with day-to-day animal care and husbandry, responsible for manure management. An unanticipated but potential implication of such legislation may be a movement toward large-scale ownership integration. Contractors would reduce environmental risks by acquiring more land and directly controlling land application. Consequently, by increasing the level of integration, contractors internalize environmental risk rather than leave them in the hands of contract growers who may not comply or would require significant monitoring.

Second, an alternative viewpoint suggests that environmental regulations may impact the movement toward production contracts rather than large-scale ownership integration as a form

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[1]While recognizing that there are many forms of vertical coordination along the spectrum (e.g., cooperatives, alliances, marketing contracts), for purposes of this discussion, we choose to focus on the movement towards production contracts and large-scale ownership integration.

of vertical coordination. Gillespie, Karantininis and Storey found that environmental mandates affecting the Quebec hog industry encouraged integrators to discontinue expansion by ownership integration and to return to production contracting. The impetus for this was the requirement that producers own enough land on which to spread manure at acceptable rates. Without the ability to contract with producers, particularly at the finishing phase where the greatest volume of swine manure is generated, integrators would be required to own the land, thereby increasing their capital investment.

A final issue governing the relationship between environmental regulations and vertical coordination is the movement toward more specialized livestock and poultry farms. As farms have moved away from their traditional base as diversified animal-feed operations and toward more specialized livestock and poultry farms, environmental concerns arise due to the increase in animal density without a coinciding increase in the availability of cropland for manure application. Increased specialization is particularly apparent in the broiler chicken industry where production contracts are the dominant form of vertical coordination accounting for roughly 90% of production. In the pork industry, where production contracts account for approximately 25% of total hog inventory, contracting accentuates the limited land base under a farmer's control. Because feed is not provided by the contract grower, the contract grower does not necessarily own or control the acreage necessary to apply increasing volumes of manure nutrients. However, here regional differences are quite acute. Whereas contract hog farms in North Carolina tend to be less than 100 acres with high animal-to-land ratios, a recent survey of pork producers in Michigan showed that over two-thirds of the responding contract growers were also significant cash crop farmers (Martin). Similarly, growth in contract pork production in the Oklahoma and Texas Panhandles has been facilitated by the large land base available to balance manure nutrients with crop utilization.

In general, we conclude that there is conflicting evidence as to what role environmental regulations have played in the form of vertical coordination. Certainly, there is a movement away from spot markets to a more tightly-coordinated industry structure. However, a myriad of factors, including transactions costs, risk, consumer demands, and reduced production costs resulting from specialization, has facilitated the transition.

Before moving to issues of location, the role of state-level anticorporate farming laws and their impact on structure merits discussion. At least nine Midwestern states prohibit corporations from owning farmland or farm operations.[2] Krause argues that the intent of anticorporate legislation is to "exclude large outside agribusinesses and conglomerates from direct production and from controlling farm production (Krause, as reported in Knoeber)." Knoeber suggests

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[2]Exceptions and exemptions to the bans are found in most state laws. For instance, most states allow family farm corporations or limited liability corporations. Some allow certain types of corporations to engage in farming activities, but place restrictions on the number of shareholders and/or the residencies of the shareholders. In addition, others permit authorized farm corporations.

that corporations are singled out because of their size, rather than the particular form of business organization. However, by limiting the organizational structure of farming and therefore the form of vertical coordination, these states make social and economic choices to limit the choice of coordinating mechanisms available to farmers and the livestock and poultry subsectors. By doing so, producers are constrained to operate in a different business environment relative to their counterparts in other states. Of the nine states with explicit anticorporate farming laws, only three, Minnesota, Oklahoma, and Missouri, have experienced a growth in total hog inventories over the last 10 years. Smith and Kuch raise the question of whether environmental regulation "may be used as an additional barrier against entry of industrialized operations [p.1246]." Certainly, the existence of anticorporate farming laws is likely as important as, if not more important than, environmental regulation in affecting locational changes in an industry becoming more tightly coordinated.

Location

Have environmental regulations influenced changes in location, either between or within regions, of animal production? Consider first changes in location between regions. That industries move to areas which offer a lax environmental regulatory environment is a common conjecture. In a recent survey article, Jaffe et al. examined the "widespread belief that environmental regulations have a significant effect on the siting of new plants in the United States [p. 148]."[3] Their review of the research evidence indicated that such concerns "may not be well-founded [p.148]." Anecdotal evidence suggests that such concerns also may not be well-founded in agriculture. In her review of changes in the dairy industry, Purvis explains:

> "Texas dairy producers resent the sweeping generalization that they fled California's stringent environmental laws, seeking a more laissez-faire situation in the Texas of the early 1980s. They moved to Texas seeking inexpensive land, low-cost feedstuffs, and proximity both to a dairy service infrastructure (such as veterinarians and nutritionists) and to urban amenities (the Dallas-Fort Worth metroplex) [p.24]."

Other evidence exists to suggest that regional changes in the location of animal production do not correlate with the existence of lax environmental regulations. Using indicators of states' commitment to and institutional capability for environmental protection programs, Lester classified states according to their likelihood to implement environmental regulations. According to his classification, the environmentally progressive states (CA, FL, MD, MA, MI, NJ, NY, OR, WA, and WI) are those judged to have both a strong commitment to and the institutional capability for environmental protection. The "strugglers" (CN, DE, HI, ID, IA, ME, MN, MT, NC, ND, NH, NV, RI and VT) are states that have the commitment, but lack

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[3]Jaffe et al. reviewed research addressing manufacturing firms rather than natural resource-based industries (such as agriculture) because 1) "that's where the research is [p.136]" and 2) because of their wish to examine the issue of "flight" of industries in the manufacturing sector from the U.S. to other countries.

institutional capability and/or resources. The "delayers" (AL, AK, AR, GA, IL, LA, MO, OH, OK, PA, SC, TN, TX, VA and WV) are those states that have the institutional capabilities for but a weak commitment to environmental protection and are therefore likely to maintain the status quo. The environmentally regressive states (AZ, KY, KS, MS, NE, NM, SD, UT and WY) have neither the commitment nor the institutional capabilities to pursue environmental protection (Lester).

In Figure 1, each state's classification is overlaid with statistics indicating the change in the state's relative rank in pork production. Figure 1 illustrates that both increases and decreases in relative ranks have occurred in states with similar environmental classifications. Although this does not rule out the possibility of environmental regulations impacting changes in the location of animal agriculture, it does suggest that there are other forces, such as clustering and agglomeration economies, driving the shifts.[4]

Clustering in animal agriculture arises from production facilities locating in close proximity to one another within a given region (Pagano and Abdalla). Clustering is a cumulative phenomenon. The establishment of a processing facility, for example, draws increasing numbers of producers. Once sited, producers tend to adopt production and manure management technologies to achieve improvements in economies of size, adding animals to generate revenue to pay for such technological improvements. In addition, new entrants are attracted by the positive economic dynamics of a well-established cluster and its allied agribusinesses, and greater production volume from existing production facilities and new entrants triggers expansion in processing capacity (Norris and Thurow).

The development of a cluster of beef feedlots in the High Plains during the 1970s and 1980s has been attributed to proximity to feed-grain supplies and large slaughter plants, a favorable climate, readily available supplies of feeder cattle, and proximity to southern and western markets for processed beef (Dietrich et al.). Construction of feed mills and poultry processing facilities in eastern Oklahoma resulted in a significant regional growth in broiler production. Growth in eastern North Carolina's hog industry, spurred by investments on the part of three major integrators, in turn led to the construction of a packing facility in neighboring Bladen County, thereby strengthening the incentives to further increase production in that region.

It is the clustering phenomenon that has, more often than not, triggered changes in environmental regulations. States which have recently passed laws focusing on manure management are responding to significant growth in animal numbers and clustering and to resulting concerns about animal densities, nutrient balances, and water and air quality. However, regulations requiring stringent manure management are less likely to affect where livestock operations are sited than how they are managed. Instead, it appears that local land

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[4]Regional shifts of similar magnitude have been observed in the cattle feeding, broiler and dairy industries.

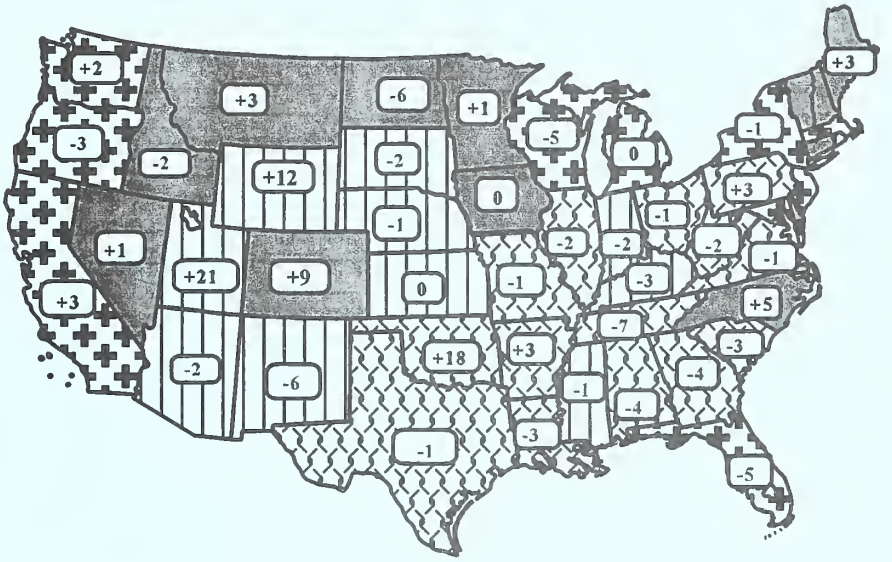
use policy is playing a significant role in livestock siting decisions. Localities in Minnesota and Michigan are using zoning authority to guide, and often limit, the siting of new and/or expanding livestock operations. While evidence about the rationality of zoning decisions is mixed, it appears that local zoning boards are attempting to consider not only environmental concerns (e.g., prevention of water quality problems) but also social and quality of life concerns (proximity of operations to public facilities, residential areas, etc.).

Conclusions

We believe it is an oversimplification to state that environmental regulations have significantly impacted the structure of animal agriculture. Moreover, we suggest that changes in farm size, form of vertical coordination and location of animal agriculture are, themselves, the cause of changes in environmental regulations. The driving force behind these changes is a myriad of economic, social and environmental factors.

Technological change has been the greatest driving force in changing farm size, but the impact of this change is intertwined with a host of influences. Production contracts and large-scale ownership integration have changed the face of American agriculture by impacting the economic and social status quo. As animal industries continue to evolve, public policies, including environmental regulations, will have the potential to impact industry structure. The cost of environmental compliance has the potential to impact farm size, coordination mechanism and location of animal agriculture. However, as more states institute manure management standards, expect climatic and geologic factors to be more important influences on structure than environmental regulations per se. Climatic and geographic factors, which vary widely, make it much less costly to comply with environmental regulations in some regions than in others, so state and federal standards for manure management may cause larger shifts between regions. Local land use policies will likely affect location in terms of how they address the clustering phenomenon. In short, empirical research is needed to determine the magnitude and direction of impact of these contemporaneous economic, social, and environmental forces on the changing structure of animal agriculture.

Figure 1. States' Likelihood to Pursue Environmental Protection and States' Change in Relative Rank



Lester's (1994) classification of states' likelihood to implement stringent environmental regulations:

= environmentally progressive states
= "strugglers"
= "delayers"
= environmentally regressive states

Number indicates the change in the state's relative rank between 1985 and 1997, based on December 1 Hog Inventory, USDA.

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COTTON CONSUMPTION TRENDS IN LATIN AMERICA

by

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Ladies and Gentlemen:

When the U.S. Congress passed the NAFTA treaty in 1994 our relations with our two next-door neighbors entered into a new era. The U.S. formally recognized that Mexico and Canada were of special importance, and therefore deserved preferential treatment. Especially Mexico, with its population of about 92 million.

As far as cotton is concerned, Latin America has a very mixed history. Since before W.W.II, and through the early 90's, Latin America was predominantly a producer and net exporter of raw cotton, (Exhibit #1) particularly Mexico, Central America, Brazil and Peru. During this decade, Latin America's raw cotton trade has undergone significant changes; it is now a net importer of over 2 million bales per year (Exhibit # 2). Although Latin America has had a textile industry for a long time, mostly in Mexico and Brazil, it used to be of lesser importance in the global picture. Total cotton consumption was only 2.0 million bales in 1950 and 4.8 million bales in 1980. For 1997/98 it is estimated around 7.5 million bales (Exhibit # 3) or about 8.5% of total world cotton use. On the other hand, cotton production in the region has dropped from its high of 8.2 million bales in 1990/91 to 5.8 million bales this year (Exhibit # 4). What are the reasons for this drop in production? In Mexico and Brazil, growers have received only sporadic support from their governments in recent years, and they have simply turned to more profitable crops, whereas Argentina has invested heavily in cotton's infrastructure and as a result production has risen sharply.

The outlook for cotton consumption in Latin America is good. Led by the two main consuming markets, Mexico and Brazil, I expect that cotton use will increase in excess of 30% over the next five years. This is good news for American cotton farmers who can expect to see continuous and rising demand for U.S. cotton in Latin America, especially in Mexico and Central America.

Let's look at the various markets in detail:

MEXICO:
The Mexican textile industry has benefited strongly from NAFTA. Cotton use was between 525,000 and 875,000 bales per year from 1980 through 1994. Since then, consumption has more than doubled to an estimated 2.1 million bales in 1997/98. In fact, I feel that Mexico's mill use may reach as much as 2.4 million bales in 1998/99 (Exhibit # 5). With a domestic crop estimated this year at 870,000 bales, the bulk of the consumption will be imported. At least 90% of all cotton imports originate in the U.S., the rest comes from South America and maybe West Africa. I prefer not to say that Mexico is a captive market for U.S. cotton, as this might imply a

dangerous complacency. But, the fact is that U.S. cotton has several advantages that other origins simply cannot match. First of all, there is the geographic proximity to the world's largest exporter, meaning not only lower transportation costs and "just-in-time" delivery, but also the widest possible selection of qualities, from short staple, low grade cotton to the finest ELS. Second, every U.S. bale has HVI (High Volume Instrument) class, a feature that the Mexican mills have learned to appreciate, particularly when using Cotton Inc.'s EFS (Engineered Fiber System) technology. Furthermore, some U.S. retailers demand that their products be made of U.S. fiber, not just any cotton. Finally, there is the GSM program, which makes short to medium-term credit available to the Mexican mills at U.S. interest rates. In a country where local rates tend to be high, this is a very important tool.

Mexico has always had the advantage of much lower labor costs compared with the U.S. But, only after NAFTA caused most import tariffs to disappear has the cost advantage come strongly into focus. Mexican mill owners have invested heavily in increasing and up-dating their facilities. U.S. manufacturers have recognized Mexico's potential and entered into partnerships with Mexican companies or are opening up their own production facilities. Textile companies from Taiwan and Korea are doing the same in order to be able to take advantage of the huge U.S. market. Of course, the cost advantage is most pronounced in apparel production, which is very labor-intensive. There are numerous apparel plants which convert U.S.-made textiles into garments that are then shipped back to the U.S. market. Other U.S. garment manufacturers have begun to out-source production to Mexico. Another advantage of the proximity to the U.S. comes into play here: Quick changes in fashion, seasonal or others, be it in color, shades, styles, weight or size of any garment can be made and put back on the U.S. retailers' shelves in less time than from anywhere else outside the U.S.

The industry has gained enormously from NAFTA. This is a textbook case of what a free-trade agreement can do for the countries involved. In both the U.S. and Mexico, cotton consumption has reached record levels. In other words, it cannot be argued that the expansion of Mexico's textile industry has come at the expense of the U.S. mills.

At present, the export market is strong but the domestic market has been difficult since 1994 and is improving only very slowly. In addition, Mexico's textile industrialists are worried about the turmoil in Asia. Mexico has no import quotas for textiles, so the potential for a flood of cheap garments cannot be dismissed. Still, looking ahead, I am convinced that cotton use in Mexico will increase by as much as 10% per year over the next five years. This could result in an annual cotton consumption approaching 3.5 million bales by 2002/03 (Exhibit # 6). The growth is almost entirely export-related. What could threaten this booming industry? If Central American countries were to be granted C.B.I. (Caribbean Basin Initiative) parity, Mexico would cease to be the low cost producer of the area with the result that some of Mexico's consumption, and potential new investments there, would be shifted into Guatemala, Salvador and other countries.

BRAZIL

Brazil is a typical example of a traditional net cotton exporter gradually turning into a net importer and is unlikely to return to its former prominence as a cotton producer and exporter. Since 1980/81, Brazil's cotton consumption advanced from less than 2.6 million bales to 3.7 million in 1996/97. Due to poor business conditions in the past six months, consumption in 1997/98 is expected to be down somewhat.

There has been a distinct relocation of the textile industry from the south to the northeast. The northeastern states provided generous tax advantages, resulting in some very large mills being set

up in the area. In fact, the top three northeastern mills, all denim producers, account for over 40% of Brazil's cotton use. In contrast to Mexico, the growth of Brazil's textile industry is mostly based on the domestic market, which today represents 80% of the consumption.

At this time, the Brazilian industry is also concerned about the economic problems in Asia and the prospects of cheap imports. On the other hand, with a presidential election coming up, money is likely to flow more freely, and textile consumption should pick up. I am estimating Brazil's consumption for 1998/99 at around 3.8 million bales, up nicely from this season's 3.5 million bales (Exhibit # 7).

The outlook is for a continuation of growth in cotton consumption. I project an average growth of over 3% per year for the next five years to 4.3 million bales. Brazil's cotton consumption has a great potential: It already has the installed capacity to process about 4.5 million bales. Even a small increase in the per capita consumption of its 160 million inhabitants would produce a large boost. Brazil has cheap labor and energy, almost unlimited water resources and, finally, can cover all its cotton requirements from its own production and its Mercosur neighbors around the corner, Argentina and Paraguay. Regarding non-Mercosur imports, U.S. cotton does not have a natural advantage in this market. It must fight against fierce competition from West Africa and Central Asia. What are the limitations to Brazil's growth in cotton consumption? The strong need for modernization of the industry, a still missing reduction in cost through a tax reform and export incentives by means of a more flexible exchange rate policy, and the aggressive competition from Mexico in many of Brazil's important export markets, principally the U.S., Canada and Europe.

ARGENTINA

Argentina is the third-largest cotton consumer in Latin America. Annual consumption is running around 500,000 bales. The highest level was 650,000 bales in 1990/91. In contrast to Mexico and Brazil, there is no up-trend in cotton use; it has been essentially flat for the past five years (Exhibit # 8). The country's population is not large enough to sustain a large cotton consumption. Also, contrary to Mexico and Brazil, cotton production has been increasing rapidly. From less than 850,000 bales in the early 80's, Argentina has now reached an annual production level of over 2.0 million bales, making increasingly large amounts of cotton available for export. At this time I do not see an increase of cotton consumption in Argentina.

OTHER MARKETS

CENTRAL AMERICA

Close to home, we have the small nations of CENTRAL AMERICA. As I already mentioned, Central America used to be a major supplier of cotton to the world market. Today, there is practically no cotton production left in the area. But, the textile industries in Guatemala and Salvador have expanded to the point where these countries are now important customers for U.S.-grown cotton. Mill use in Guatemala runs about 135,000 bales and Salvador about 125,000 bales per year (Exhibit # 9). Both countries are expected to increase consumption in the years ahead, maybe about 5% annually. The textile people are hopeful that their countries will soon be granted C.B.I. parity or one day be admitted into an expanded NAFTA. Either would put their mills on a more level playing field with Mexico and greatly improve the cotton consumption potential of this region. Apart from Guatemala and Salvador, only Honduras, Costa Rica and Nicaragua have very small textile activity at this time.

ANDEAN PACT COUNTRIES

The Andean Pact is a free-trade organization whose members are Colombia, Peru, Venezuela, Ecuador, and Bolivia, with a total population of about 103 million people. Since regionally produced cotton is not always available, U.S. cotton has a good shot at the business in some of these markets.

COLOMBIA used to be an important cotton producer. Cotton consumption has been quite erratic, rising from 250-275,000 bales in the early 80's to about 450,000 bales in 1990/91, and around 350,000 bales at present. U.S. cotton has a chance if it is priced competitively. The industry has modernized somewhat, but much more needs to be done in order to improve productivity and, consequently, the volume of consumption.

PERU is one of the world's oldest cotton-producing countries. Its fine ELS-type cotton, Pima, is well known. Cotton production in Peru has declined, but consumption has been increasing slowly over time, reaching about 300-325,000 bales in recent years. I feel that Peru's consumption will increase steadily over the next few years. The creative approach to marketing their high quality fabrics and garments in the U.S. and Europe will allow its industry to grow.

VENEZUELA uses about 175-200,000 bales of cotton per year, and this has not changed much in the past decade. Domestic production covers less than half of their consumption. The country is a small but steady buyer of U.S. cotton. I do not expect to see much change in the rate of cotton consumption in the years ahead. ECUADOR and BOLIVIA are small consuming countries that may reach 100,000 bales in five years. Ecuador has imported limited quantities of U.S. cotton in recent years, and should continue to do so (Exhibit # 10).

OTHER SOUTH AMERICAN COUNTRIES

This leaves us with CHILE, PARAGUAY and URUGUAY, with a total annual consumption of about 200-225,000 bales. Chile has a small textile industry, which obtains its cotton mostly duty-free from South-American suppliers. U.S. cotton faces a 11% import duty. The granting of NAFTA parity could change things rapidly. Otherwise, Chile, being an associate member of the Mercosur customs union, is expected to become a full member by the year 2006. I cannot see an increase in its consumption until NAFTA parity is a reality or when Chile will be able to "free trade" with Brazil and Argentina, the dominant members of the Mercosur. Paraguay is a major cotton-producing country, with only a small domestic spinning industry (Exhibit # 11).

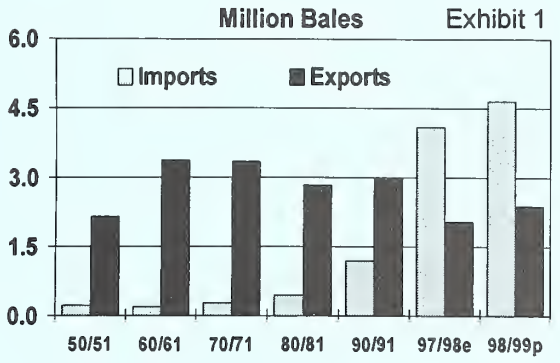
SUMMARY

To sum up, cotton consumption is clearly in an up-trend, led strongly by Mexico and Brazil. The granting of C.B.I. parity, extending NAFTA, or the implementation of other free trade agreements with the U.S. would boost cotton consumption in the respective countries, just as it did for Mexico, which has greatly benefited from the free access to the huge consumer market of the United States. Latin America is a significant market for cotton. U.S. raw cotton has a definite advantage in Mexico and Central America, and must fight for market share in the other countries.

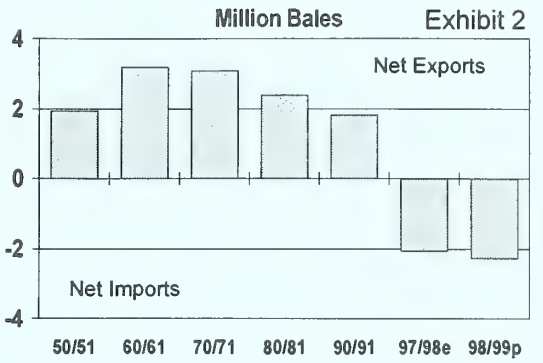
I am projecting Latin American cotton consumption to increase by about 30% over the next five years, from 7.55 million bales in 1997/98 to 10.0 million bales by the year 2002/03 (Exhibit # 12). At this time, I do not see polyester as much of a threat to cotton consumption in the region. Polyester production in Latin America is small and therefore relatively expensive.

What else will change over the next five years? Inter-American alliances will be formed and mergers/joint-ventures will increase between the large U.S. manufacturers and their counterparts in Mexico and Brazil. Both these countries have two significant advantages over other cotton consuming countries of the world: close access to very competitively priced raw cotton, U.S./Mexican cotton in the case of Mexico, and Brazilian/Argentine/Paraguayan for Brazil. Furthermore, both countries have cheap labor. Considering that the cost of raw cotton represents over 60% and labor about 10% of the inputs that go into a heavy-weight denim fabric, these are very significant advantages!

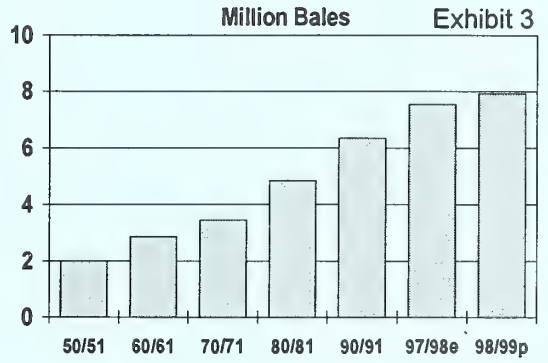
Latin America Cotton Trade



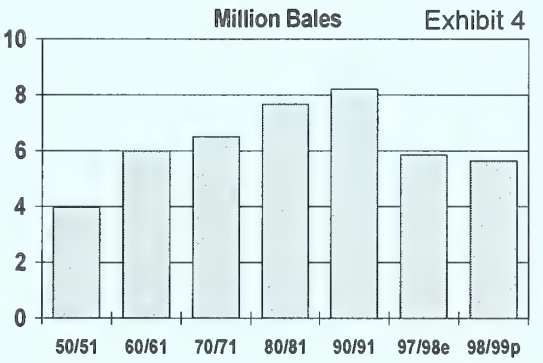
Latin America Cotton Net Trade



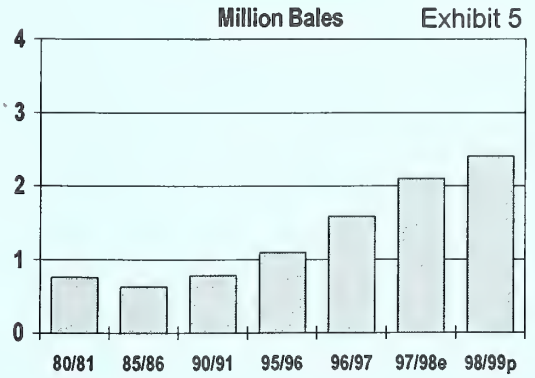
Latin America Cotton Consumption



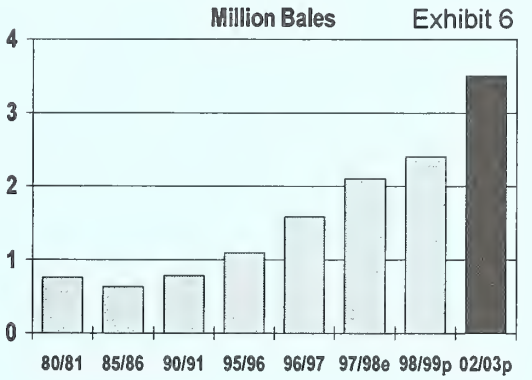
Latin America Cotton Production



Mexican Cotton Consumption

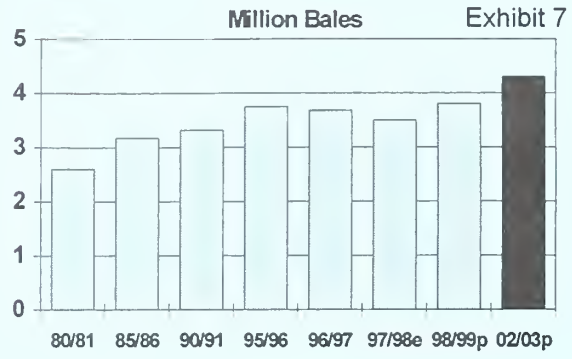


Mexican Cotton Consumption

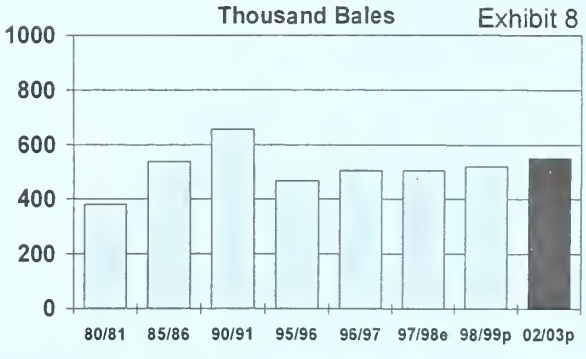


Source: ICAC, Paul Reinhart

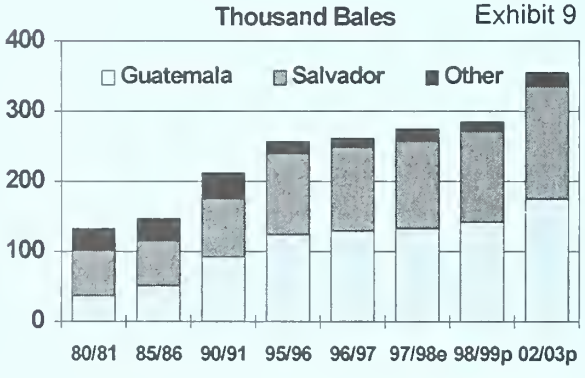
Brazil Cotton Consumption



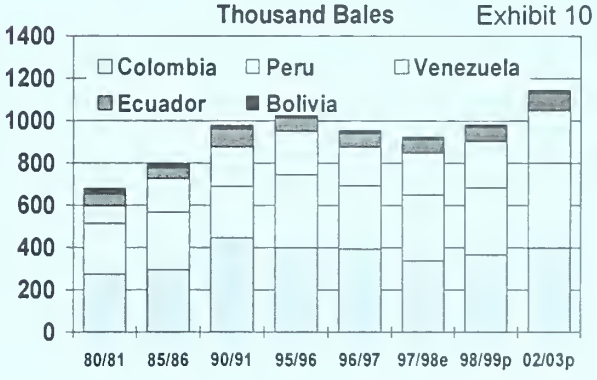
Argentina Cotton Consumption



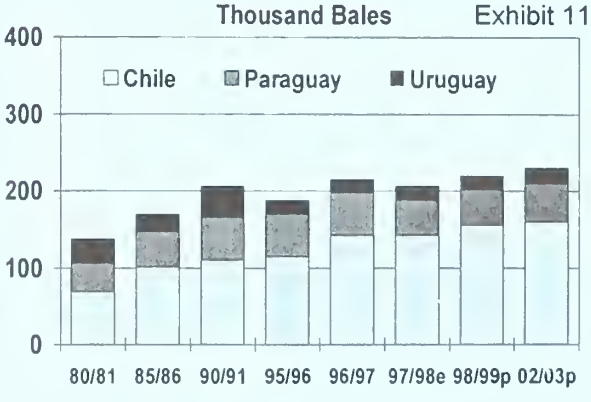
Central America Cotton Consumption



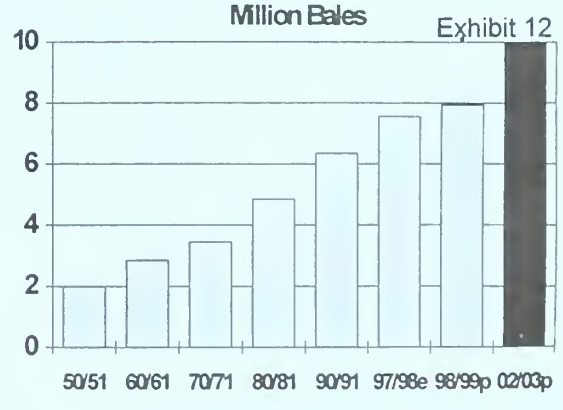
Andean Pact Cotton Consumption



Other South American Countries Cotton Consumption



Latin America Cotton Consumption



Source: ICAC, Paul Reinhart